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Conf. No.:	8787	§ Group Art Unit:	2835
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Appln. No.:	10/805,700	§ Examiner:	Robert Joseph Hoffberg
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Filing Date:	March 22, 2004	§ Attorney Docket No.:	10844-46US (204002(E-§ 1)

Title: Thermal Fuse Having A Function Of A Current Fuse

AMENDMENT

This is in response to the Office Action dated March 3, 2006 (Paper No. 20060215) in the above application. This response is being timely submitted by June 5, 2006 (June 3, 2006 being a Saturday).

Please amend the above-identified application, without prejudice, as follows:

Amendments to the specification:

Please amend paragraph [0023] of the specification to read as follows:

[0023] [Embodiment of the Invention]

Hereinafter, embodiments of the invention will be described with reference to the accompanying drawings.

The thin thermal fuse having a function of a current fuse according to the invention is a thermal fuse in which a low-melting fusible alloy piece having an alloy composition containing 40 to 70% Bi is connected between a pair of flat lead conductors, a flux is applied to the low-melting fusible alloy piece, the flux-applied low-melting fusible alloy piece is sandwiched between a resin base film and a resin cover film to provide insulation. The thermal fuse is used as a protector for a secondary battery such as a lithium-ion secondary battery or a lithium polymer secondary battery, in a state where the thermal fuse is thermally in contact with the battery. The melting point and resistance of the low-melting fusible alloy piece are set so that the low-melting fusible alloy piece is fused off when the temperature of the battery is raised to an allowable maximum temperature of 85 to 95°C, or when the current reaches an allowable maximum of ~~50 to 100 A~~ 2 to 10 A and 1,000 s.

Amendments to and Listing of the Claims:

Please amend claims 1 and 37-72 so that the claims read as follows:

1. (currently amended) A thermal fuse having a function of a current fuse in which a low-melting fusible alloy piece having an alloy composition containing 40 to 70% Bi is connected between a pair of flat lead conductors, a flux is applied to said low-melting fusible alloy piece, and said flux-applied low-melting fusible alloy piece is sandwiched between a resin base film and a resin cover film to provide insulation, wherein

a resistance of said low-melting fusible alloy piece is set so as to enable said low-melting fusible alloy piece to be also fused off [[also]] by Joule heat when the current reaches ~~due to~~ an allowable maximum current [[of]] value for a secondary battery and wherein an operating current of said low-melting fusible alloy piece at 5 ms is larger than 100 A.

2. (original) A thermal fuse having a function of a current fuse according to claim 1, wherein a melting point of said low-melting fusible alloy piece is 85 to 95°C, and the allowable maximum current is a current of 2 to 10 A and 1,000 seconds.

3. (original)A thermal fuse having a function of a current fuse according to claim 1, wherein front end portions of said pair of flat lead conductors are secured to a rear face of said resin base film, a part of each of said front end portions is exposed from a surface of said base film, said low-melting fusible alloy piece is connected between said exposed parts, the flux is applied to said low-melting fusible alloy piece, and an area above said base film is sealed by said resin cover film.

4. (original)A thermal fuse having a function of a current fuse according to claim 2, wherein front end portions of said pair of flat lead conductors are secured to a rear face of said resin base film, a part of each of said front end portions is exposed from a surface of said base film, said low-melting fusible alloy piece is connected between said exposed parts, the flux is applied to said low-melting fusible alloy piece, and an area above said base film is sealed by said resin cover film.

5. (original)A thermal fuse having a function of a current fuse according to claim 1, wherein said pair of flat lead conductors, and said flux-applied low-melting fusible alloy piece which is connected between upper faces of tip end portions of said lead conductors are sealed with being vertically sandwiched between said resin cover film and said resin base film.

6. (original)A thermal fuse having a function of a current fuse according to claim 2, wherein said pair of flat lead conductors, and said flux-applied low-melting fusible alloy piece which is connected between upper faces of tip end portions of said lead conductors are sealed with being vertically sandwiched between said resin cover film and said resin base film.

7. (original) A thermal fuse having a function of a current fuse according to claim 1, wherein a balance of the alloy composition containing 40 to 70% Bi is In and inevitable impurities.

8. (original)A thermal fuse having a function of a current fuse according to claim 2, wherein a balance of the alloy composition containing 40 to 70% Bi is In and inevitable impurities.

9. (original)A thermal fuse having a function of a current fuse according to claim 3, wherein a balance of the alloy composition containing 40 to 70% Bi is In and inevitable impurities.

10. (original) A thermal fuse having a function of a current fuse according to claim 4, wherein a balance of the alloy composition containing 40 to 70% Bi is In and inevitable impurities.

11. (original)A thermal fuse having a function of a current fuse according to claim 5, wherein a balance of the alloy composition containing 40 to 70% Bi is In and inevitable impurities.

12. (original)A thermal fuse having a function of a current fuse according to claim 6, wherein a balance of the alloy composition containing 40 to 70% Bi is In and inevitable impurities.

13. (original)A thermal fuse having a function of a current fuse according to claim 1, wherein a balance of the alloy composition containing 40 to 70% Bi is In, inevitable impurities, and 0.05 to 5% of at least one of Ag, Cu, Au, Sb, Ni, Pt, Pd, Ge, and P.

14. (original)A thermal fuse having a function of a current fuse according to claim 2, wherein a balance of the alloy composition containing 40 to 70% Bi is In, inevitable impurities, and 0.05 to 5% of at least one of Ag, Cu, Au, Sb, Ni, Pt, Pd, Ge, and P.

15. (original)A thermal fuse having a function of a current fuse according to claim 3, wherein a balance of the alloy composition containing 40 to 70% Bi is In, inevitable impurities, and 0.05 to 5% of at least one of Ag, Cu, Au, Sb, Ni, Pt, Pd, Ge, and P.

16. (original)A thermal fuse having a function of a current fuse according to claim 4, wherein a balance of the alloy composition containing 40 to 70% Bi is In, inevitable impurities, and 0.05 to 5% of at least one of Ag, Cu, Au, Sb, Ni, Pt, Pd, Ge, and P.

17. (original)A thermal fuse having a function of a current fuse according to claim 5, wherein a balance of the alloy composition containing 40 to 70% Bi is In, inevitable impurities, and 0.05 to 5% of at least one of Ag, Cu, Au, Sb, Ni, Pt, Pd, Ge, and P.

18. (original)A thermal fuse having a function of a current fuse according to claim 6, wherein a balance of the alloy composition containing 40 to 70% Bi is In, inevitable impurities, and 0.05 to 5% of at least one of Ag, Cu, Au, Sb, Ni, Pt, Pd, Ge, and P.

19. (original)A thermal fuse having a function of a current fuse according to claim 1, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

20. (original)A thermal fuse having a function of a current fuse according to claim 2, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

21. (original)A thermal fuse having a function of a current fuse according to claim 3, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

22. (original)A thermal fuse having a function of a current fuse according to claim 4, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

23. (original)A thermal fuse having a function of a current fuse according to claim 5, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

24. (original)A thermal fuse having a function of a current fuse according to claim 6, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

25. (original)A thermal fuse having a function of a current fuse according to claim 7, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

26. (original)A thermal fuse having a function of a current fuse according to claim 8, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

27. (original)A thermal fuse having a function of a current fuse according to claim 9, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

28. (original)A thermal fuse having a function of a current fuse according to claim 10, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

29. (original)A thermal fuse having a function of a current fuse according to claim 11, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

30. (original)A thermal fuse having a function of a current fuse according to claim 12, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

31. (original)A thermal fuse having a function of a current fuse according to claim 13, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

32. (original)A thermal fuse having a function of a current fuse according to claim 14, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

33. (original)A thermal fuse having a function of a current fuse according to claim 15, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

34. (original)A thermal fuse having a function of a current fuse according to claim 16, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

35. (original)A thermal fuse having a function of a current fuse according to claim 17, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

36. (original)A thermal fuse having a function of a current fuse according to claim 18, wherein a resistance of said low-melting fusible alloy piece is 4.5 to 50 mΩ.

37. (currently amended) A thermal fuse having a function of a current fuse according to claim 1, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

38. (currently amended)A thermal fuse having a function of a current fuse according to claim 2, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

39. (currently amended)A thermal fuse having a function of a current fuse according to claim 3, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

40. (currently amended)A thermal fuse having a function of a current fuse according to claim 4, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

41. (currently amended)A thermal fuse having a function of a current fuse according to claim 5, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

42. (currently amended)A thermal fuse having a function of a current fuse according to claim 6, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

43. (currently amended)A thermal fuse having a function of a current fuse according to claim 7, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

44. (currently amended)A thermal fuse having a function of a current fuse according to claim 8, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

45. (currently amended)A thermal fuse having a function of a current fuse according to claim 9, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

46. (currently amended)A thermal fuse having a function of a current fuse according to claim 10, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

47. (currently amended)A thermal fuse having a function of a current fuse according to claim 11, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

48. (currently amended)A thermal fuse having a function of a current fuse according to claim 12, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

49. (currently amended)A thermal fuse having a function of a current fuse according to claim 13, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

50. (currently amended)A thermal fuse having a function of a current fuse according to claim 14, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

51. (currently amended)A thermal fuse having a function of a current fuse according to claim 15, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

52. (currently amended)A thermal fuse having a function of a current fuse according to claim 16, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

53. (currently amended)A thermal fuse having a function of a current fuse according to claim 17, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

54. (currently amended)A thermal fuse having a function of a current fuse according to claim 18, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

55. (currently amended)A thermal fuse having a function of a current fuse according to claim 19, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

56. (currently amended)A thermal fuse having a function of a current fuse according to claim 20, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

57. (currently amended)A thermal fuse having a function of a current fuse according to claim 21, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

58. (currently amended)A thermal fuse having a function of a current fuse according to claim 22, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

59. (currently amended)A thermal fuse having a function of a current fuse according to claim 23, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

60. (currently amended)A thermal fuse having a function of a current fuse according to claim 24, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

61. (currently amended)A thermal fuse having a function of a current fuse according to claim 25, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

62. (currently amended)A thermal fuse having a function of a current fuse according to claim 26, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

63. (currently amended)A thermal fuse having a function of a current fuse according to claim 27, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

64. (currently amended)A thermal fuse having a function of a current fuse according to claim 28, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

65. (currently amended)A thermal fuse having a function of a current fuse according to claim 29, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

66. (currently amended)A thermal fuse having a function of a current fuse according to claim 30, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

67. (currently amended)A thermal fuse having a function of a current fuse according to claim 31, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

68. (currently amended)A thermal fuse having a function of a current fuse according to claim 32, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

69. (currently amended)A thermal fuse having a function of a current fuse according to claim 33, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

70. (currently amended)A thermal fuse having a function of a current fuse according to claim 34, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

71. (currently amended)A thermal fuse having a function of a current fuse according to claim 35, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

72. (currently amended)A thermal fuse having a function of a current fuse according to claim 36, wherein a ratio d/t of an outer diameter d of said low-melting fusible alloy piece to a thickness t of each of said flat lead conductors is 2 to ~~5~~ 4.

73. (original) A thermal fuse having a function of a current fuse according to claim 1, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

74. (original) A thermal fuse having a function of a current fuse according to claim 2, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

75. (original) A thermal fuse having a function of a current fuse according to claim 3, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

76. (original) A thermal fuse having a function of a current fuse according to claim 4, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

77. (original) A thermal fuse having a function of a current fuse according to claim 5, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

78. (original) A thermal fuse having a function of a current fuse according to claim 6, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

79. (original) A thermal fuse having a function of a current fuse according to claim 7, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

80. (original) A thermal fuse having a function of a current fuse according to claim 8, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

81. (original) A thermal fuse having a function of a current fuse according to claim 9, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

82. (original) A thermal fuse having a function of a current fuse according to claim 10, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

83. (original) A thermal fuse having a function of a current fuse according to claim 11, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

84. (original) A thermal fuse having a function of a current fuse according to claim 12, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

85. (original) A thermal fuse having a function of a current fuse according to claim 13, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

86. (original) A thermal fuse having a function of a current fuse according to claim 14, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

87. (original) A thermal fuse having a function of a current fuse according to claim 15, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

88. (original) A thermal fuse having a function of a current fuse according to claim 16, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

89. (original) A thermal fuse having a function of a current fuse according to claim 17, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

90. (original) A thermal fuse having a function of a current fuse according to claim 18, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

91. (original) A thermal fuse having a function of a current fuse according to claim 19, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

92. (original) A thermal fuse having a function of a current fuse according to claim 20, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

93. (original) A thermal fuse having a function of a current fuse according to claim 21, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

94. (original) A thermal fuse having a function of a current fuse according to claim 22, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

95. (original) A thermal fuse having a function of a current fuse according to claim 23, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

96. (original) A thermal fuse having a function of a current fuse according to claim 24, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

97. (original) A thermal fuse having a function of a current fuse according to claim 25, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

98. (original) A thermal fuse having a function of a current fuse according to claim 26, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

99. (original) A thermal fuse having a function of a current fuse according to claim 27, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

100. (original) A thermal fuse having a function of a current fuse according to claim 28, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

101. (original) A thermal fuse having a function of a current fuse according to claim 29, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

102. (original) A thermal fuse having a function of a current fuse according to claim 30, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

103. (original) A thermal fuse having a function of a current fuse according to claim 31, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

104. (original) A thermal fuse having a function of a current fuse according to claim 32, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

105. (original) A thermal fuse having a function of a current fuse according to claim 33, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

106. (original) A thermal fuse having a function of a current fuse according to claim 34, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

107. (original) A thermal fuse having a function of a current fuse according to claim 35, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

108. (original) A thermal fuse having a function of a current fuse according to claim 36, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

109. (original) A thermal fuse having a function of a current fuse according to claim 37, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

110. (original) A thermal fuse having a function of a current fuse according to claim 38, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

111. (original) A thermal fuse having a function of a current fuse according to claim 39, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

112. (original) A thermal fuse having a function of a current fuse according to claim 40, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

113. (original) A thermal fuse having a function of a current fuse according to claim 41, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

114. (original) A thermal fuse having a function of a current fuse according to claim 42, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

115. (original) A thermal fuse having a function of a current fuse according to claim 43, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

116. (original) A thermal fuse having a function of a current fuse according to claim 44, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

117. (original) A thermal fuse having a function of a current fuse according to claim 45, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

118. (original) A thermal fuse having a function of a current fuse according to claim 46, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

119. (original) A thermal fuse having a function of a current fuse according to claim 47, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

120. (original) A thermal fuse having a function of a current fuse according to claim 48, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

121. (original) A thermal fuse having a function of a current fuse according to claim 49, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

122. (original) A thermal fuse having a function of a current fuse according to claim 50, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

123. (original) A thermal fuse having a function of a current fuse according to claim 51, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

124. (original) A thermal fuse having a function of a current fuse according to claim 52, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

125. (original) A thermal fuse having a function of a current fuse according to claim 53, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

126. (original) A thermal fuse having a function of a current fuse according to claim 54, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

127. (original) A thermal fuse having a function of a current fuse according to claim 55, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

128. (original) A thermal fuse having a function of a current fuse according to claim 56, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

129. (original) A thermal fuse having a function of a current fuse according to claim 57, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

130. (original) A thermal fuse having a function of a current fuse according to claim 58, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

131. (original) A thermal fuse having a function of a current fuse according to claim 59, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

132. (original) A thermal fuse having a function of a current fuse according to claim 60, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

133. (original) A thermal fuse having a function of a current fuse according to claim 61, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

134. (original) A thermal fuse having a function of a current fuse according to claim 62, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

135. (original) A thermal fuse having a function of a current fuse according to claim 63, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

136. (original) A thermal fuse having a function of a current fuse according to claim 64, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

137. (original) A thermal fuse having a function of a current fuse according to claim 65, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

138. (original) A thermal fuse having a function of a current fuse according to claim 66, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

139. (original) A thermal fuse having a function of a current fuse according to claim 67, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

140. (original) A thermal fuse having a function of a current fuse according to claim 68, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

141. (original) A thermal fuse having a function of a current fuse according to claim 69, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

142. (original) A thermal fuse having a function of a current fuse according to claim 70, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

143. (original) A thermal fuse having a function of a current fuse according to claim 71, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

144. (original) A thermal fuse having a function of a current fuse according to claim 72, wherein a thickness from a lower face of said resin base film to an upper face of said resin cover film is 2.0 mm or smaller.

145. (original) A thermal fuse having a function of a current fuse according to claim 1, wherein said flat lead conductors are made of nickel or an iron alloy.

146. (original) A thermal fuse having a function of a current fuse according to claim 2, wherein said flat lead conductors are made of nickel or an iron alloy.

147. (original) A thermal fuse having a function of a current fuse according to claim 3, wherein said flat lead conductors are made of nickel or an iron alloy.

148. (original) A thermal fuse having a function of a current fuse according to claim 4, wherein said flat lead conductors are made of nickel or an iron alloy.

149. (original) A thermal fuse having a function of a current fuse according to claim 5, wherein said flat lead conductors are made of nickel or an iron alloy.

150. (original) A thermal fuse having a function of a current fuse according to claim 6, wherein said flat lead conductors are made of nickel or an iron alloy.

151. (original) A thermal fuse having a function of a current fuse according to claim 7, wherein said flat lead conductors are made of nickel or an iron alloy.

152. (original) A thermal fuse having a function of a current fuse according to claim 8, wherein said flat lead conductors are made of nickel or an iron alloy.

153. (original) A thermal fuse having a function of a current fuse according to claim 9, wherein said flat lead conductors are made of nickel or an iron alloy.

154. (original) A thermal fuse having a function of a current fuse according to claim 10, wherein said flat lead conductors are made of nickel or an iron alloy.

155. (original) A thermal fuse having a function of a current fuse according to claim 11, wherein said flat lead conductors are made of nickel or an iron alloy.

156. (original) A thermal fuse having a function of a current fuse according to claim 12, wherein said flat lead conductors are made of nickel or an iron alloy.

157. (original) A thermal fuse having a function of a current fuse according to claim 13, wherein said flat lead conductors are made of nickel or an iron alloy.

158. (original) A thermal fuse having a function of a current fuse according to claim 14, wherein said flat lead conductors are made of nickel or an iron alloy.

159. (original) A thermal fuse having a function of a current fuse according to claim 15, wherein said flat lead conductors are made of nickel or an iron alloy.

160. (original) A thermal fuse having a function of a current fuse according to claim 16, wherein said flat lead conductors are made of nickel or an iron alloy.

161. (original) A thermal fuse having a function of a current fuse according to claim 17, wherein said flat lead conductors are made of nickel or an iron alloy.

162. (original) A thermal fuse having a function of a current fuse according to claim 18, wherein said flat lead conductors are made of nickel or an iron alloy.

163. (original) A thermal fuse having a function of a current fuse according to claim 19, wherein said flat lead conductors are made of nickel or an iron alloy.

164. (original) A thermal fuse having a function of a current fuse according to claim 20, wherein said flat lead conductors are made of nickel or an iron alloy.

165. (original) A thermal fuse having a function of a current fuse according to claim 21, wherein said flat lead conductors are made of nickel or an iron alloy.

166. (original) A thermal fuse having a function of a current fuse according to claim 22, wherein said flat lead conductors are made of nickel or an iron alloy.

167. (original) A thermal fuse having a function of a current fuse according to claim 23, wherein said flat lead conductors are made of nickel or an iron alloy.

168. (original) A thermal fuse having a function of a current fuse according to claim 24, wherein said flat lead conductors are made of nickel or an iron alloy.

169. (original) A thermal fuse having a function of a current fuse according to claim 25, wherein said flat lead conductors are made of nickel or an iron alloy.

170. (original) A thermal fuse having a function of a current fuse according to claim 26, wherein said flat lead conductors are made of nickel or an iron alloy.

171. (original) A thermal fuse having a function of a current fuse according to claim 27, wherein said flat lead conductors are made of nickel or an iron alloy.

172. (original) A thermal fuse having a function of a current fuse according to claim 28, wherein said flat lead conductors are made of nickel or an iron alloy.

173. (original) A thermal fuse having a function of a current fuse according to claim 29, wherein said flat lead conductors are made of nickel or an iron alloy.

174. (original) A thermal fuse having a function of a current fuse according to claim 30, wherein said flat lead conductors are made of nickel or an iron alloy.

175. (original) A thermal fuse having a function of a current fuse according to claim 31, wherein said flat lead conductors are made of nickel or an iron alloy.

176. (original) A thermal fuse having a function of a current fuse according to claim 32, wherein said flat lead conductors are made of nickel or an iron alloy.

177. (original) A thermal fuse having a function of a current fuse according to claim 33, wherein said flat lead conductors are made of nickel or an iron alloy.

178. (original) A thermal fuse having a function of a current fuse according to claim 34, wherein said flat lead conductors are made of nickel or an iron alloy.

179. (original) A thermal fuse having a function of a current fuse according to claim 35, wherein said flat lead conductors are made of nickel or an iron alloy.

180. (original) A thermal fuse having a function of a current fuse according to claim 36, wherein said flat lead conductors are made of nickel or an iron alloy.

181. (original) A thermal fuse having a function of a current fuse according to claim 37, wherein said flat lead conductors are made of nickel or an iron alloy.

182. (original) A thermal fuse having a function of a current fuse according to claim 38, wherein said flat lead conductors are made of nickel or an iron alloy.

183. (original) A thermal fuse having a function of a current fuse according to claim 39, wherein said flat lead conductors are made of nickel or an iron alloy.

184. (original) A thermal fuse having a function of a current fuse according to claim 40, wherein said flat lead conductors are made of nickel or an iron alloy.

185. (original) A thermal fuse having a function of a current fuse according to claim 41, wherein said flat lead conductors are made of nickel or an iron alloy.

186. (original) A thermal fuse having a function of a current fuse according to claim 42, wherein said flat lead conductors are made of nickel or an iron alloy.

187. (original) A thermal fuse having a function of a current fuse according to claim 43, wherein said flat lead conductors are made of nickel or an iron alloy.

188. (original) A thermal fuse having a function of a current fuse according to claim 44, wherein said flat lead conductors are made of nickel or an iron alloy.

189. (original) A thermal fuse having a function of a current fuse according to claim 45, wherein said flat lead conductors are made of nickel or an iron alloy.

190. (original) A thermal fuse having a function of a current fuse according to claim 46, wherein said flat lead conductors are made of nickel or an iron alloy.

191. (original) A thermal fuse having a function of a current fuse according to claim 47, wherein said flat lead conductors are made of nickel or an iron alloy.

192. (original) A thermal fuse having a function of a current fuse according to claim 48, wherein said flat lead conductors are made of nickel or an iron alloy.

193. (original) A thermal fuse having a function of a current fuse according to claim 49, wherein said flat lead conductors are made of nickel or an iron alloy.

194. (original) A thermal fuse having a function of a current fuse according to claim 50, wherein said flat lead conductors are made of nickel or an iron alloy.

195. (original) A thermal fuse having a function of a current fuse according to claim 51, wherein said flat lead conductors are made of nickel or an iron alloy.

196. (original) A thermal fuse having a function of a current fuse according to claim 52, wherein said flat lead conductors are made of nickel or an iron alloy.

197. (original) A thermal fuse having a function of a current fuse according to claim 53, wherein said flat lead conductors are made of nickel or an iron alloy.

198. (original) A thermal fuse having a function of a current fuse according to claim 54, wherein said flat lead conductors are made of nickel or an iron alloy.

199. (original) A thermal fuse having a function of a current fuse according to claim 55, wherein said flat lead conductors are made of nickel or an iron alloy.

200. (original) A thermal fuse having a function of a current fuse according to claim 56, wherein said flat lead conductors are made of nickel or an iron alloy.

201. (original) A thermal fuse having a function of a current fuse according to claim 57, wherein said flat lead conductors are made of nickel or an iron alloy.

202. (original) A thermal fuse having a function of a current fuse according to claim 58, wherein said flat lead conductors are made of nickel or an iron alloy.

203. (original) A thermal fuse having a function of a current fuse according to claim 59, wherein said flat lead conductors are made of nickel or an iron alloy.

204. (original) A thermal fuse having a function of a current fuse according to claim 60, wherein said flat lead conductors are made of nickel or an iron alloy.

205. (original) A thermal fuse having a function of a current fuse according to claim 61, wherein said flat lead conductors are made of nickel or an iron alloy.

206. (original) A thermal fuse having a function of a current fuse according to claim 62, wherein said flat lead conductors are made of nickel or an iron alloy.

207. (original) A thermal fuse having a function of a current fuse according to claim 63, wherein said flat lead conductors are made of nickel or an iron alloy.

208. (original) A thermal fuse having a function of a current fuse according to claim 64, wherein said flat lead conductors are made of nickel or an iron alloy.

209. (original) A thermal fuse having a function of a current fuse according to claim 65, wherein said flat lead conductors are made of nickel or an iron alloy.

210. (original) A thermal fuse having a function of a current fuse according to claim 66, wherein said flat lead conductors are made of nickel or an iron alloy.

211. (original) A thermal fuse having a function of a current fuse according to claim 67, wherein said flat lead conductors are made of nickel or an iron alloy.

212. (original) A thermal fuse having a function of a current fuse according to claim 68, wherein said flat lead conductors are made of nickel or an iron alloy.

213. (original) A thermal fuse having a function of a current fuse according to claim 69, wherein said flat lead conductors are made of nickel or an iron alloy.

214. (original) A thermal fuse having a function of a current fuse according to claim 70, wherein said flat lead conductors are made of nickel or an iron alloy.

215. (original) A thermal fuse having a function of a current fuse according to claim 71, wherein said flat lead conductors are made of nickel or an iron alloy.

216. (original) A thermal fuse having a function of a current fuse according to claim 72, wherein said flat lead conductors are made of nickel or an iron alloy.

217. (original) A thermal fuse having a function of a current fuse according to claim 73, wherein said flat lead conductors are made of nickel or an iron alloy.

218. (original) A thermal fuse having a function of a current fuse according to claim 74, wherein said flat lead conductors are made of nickel or an iron alloy.

219. (original) A thermal fuse having a function of a current fuse according to claim 75, wherein said flat lead conductors are made of nickel or an iron alloy.

220. (original) A thermal fuse having a function of a current fuse according to claim 76, wherein said flat lead conductors are made of nickel or an iron alloy.

221. (original) A thermal fuse having a function of a current fuse according to claim 77, wherein said flat lead conductors are made of nickel or an iron alloy.

222. (original) A thermal fuse having a function of a current fuse according to claim 78, wherein said flat lead conductors are made of nickel or an iron alloy.

223. (original) A thermal fuse having a function of a current fuse according to claim 79, wherein said flat lead conductors are made of nickel or an iron alloy.

224. (original) A thermal fuse having a function of a current fuse according to claim 80, wherein said flat lead conductors are made of nickel or an iron alloy.

225. (original) A thermal fuse having a function of a current fuse according to claim 81, wherein said flat lead conductors are made of nickel or an iron alloy.

226. (original) A thermal fuse having a function of a current fuse according to claim 82, wherein said flat lead conductors are made of nickel or an iron alloy.

227. (original) A thermal fuse having a function of a current fuse according to claim 83, wherein said flat lead conductors are made of nickel or an iron alloy.

228. (original) A thermal fuse having a function of a current fuse according to claim 84, wherein said flat lead conductors are made of nickel or an iron alloy.

229. (original) A thermal fuse having a function of a current fuse according to claim 85, wherein said flat lead conductors are made of nickel or an iron alloy.

230. (original) A thermal fuse having a function of a current fuse according to claim 86, wherein said flat lead conductors are made of nickel or an iron alloy.

231. (original) A thermal fuse having a function of a current fuse according to claim 87, wherein said flat lead conductors are made of nickel or an iron alloy.

232. (original) A thermal fuse having a function of a current fuse according to claim 88, wherein said flat lead conductors are made of nickel or an iron alloy.

233. (original) A thermal fuse having a function of a current fuse according to claim 89, wherein said flat lead conductors are made of nickel or an iron alloy.

234. (original) A thermal fuse having a function of a current fuse according to claim 90, wherein said flat lead conductors are made of nickel or an iron alloy.

235. (original) A thermal fuse having a function of a current fuse according to claim 91, wherein said flat lead conductors are made of nickel or an iron alloy.

236. (original) A thermal fuse having a function of a current fuse according to claim 92, wherein said flat lead conductors are made of nickel or an iron alloy.

237. (original) A thermal fuse having a function of a current fuse according to claim 93, wherein said flat lead conductors are made of nickel or an iron alloy.

238. (original) A thermal fuse having a function of a current fuse according to claim 94, wherein said flat lead conductors are made of nickel or an iron alloy.

239. (original) A thermal fuse having a function of a current fuse according to claim 95, wherein said flat lead conductors are made of nickel or an iron alloy.

240. (original) A thermal fuse having a function of a current fuse according to claim 96, wherein said flat lead conductors are made of nickel or an iron alloy.

241. (original) A thermal fuse having a function of a current fuse according to claim 97, wherein said flat lead conductors are made of nickel or an iron alloy.

242. (original) A thermal fuse having a function of a current fuse according to claim 98, wherein said flat lead conductors are made of nickel or an iron alloy.

243. (original) A thermal fuse having a function of a current fuse according to claim 99, wherein said flat lead conductors are made of nickel or an iron alloy.

244. (original) A thermal fuse having a function of a current fuse according to claim 100, wherein said flat lead conductors are made of nickel or an iron alloy.

245. (original) A thermal fuse having a function of a current fuse according to claim 101, wherein said flat lead conductors are made of nickel or an iron alloy.

246. (original) A thermal fuse having a function of a current fuse according to claim 102, wherein said flat lead conductors are made of nickel or an iron alloy.

247. (original) A thermal fuse having a function of a current fuse according to claim 103, wherein said flat lead conductors are made of nickel or an iron alloy.

248. (original) A thermal fuse having a function of a current fuse according to claim 104, wherein said flat lead conductors are made of nickel or an iron alloy.

249. (original) A thermal fuse having a function of a current fuse according to claim 105, wherein said flat lead conductors are made of nickel or an iron alloy.

250. (original) A thermal fuse having a function of a current fuse according to claim 106, wherein said flat lead conductors are made of nickel or an iron alloy.

251. (original) A thermal fuse having a function of a current fuse according to claim 107, wherein said flat lead conductors are made of nickel or an iron alloy.

252. (original) A thermal fuse having a function of a current fuse according to claim 108, wherein said flat lead conductors are made of nickel or an iron alloy.

253. (original) A thermal fuse having a function of a current fuse according to claim 109, wherein said flat lead conductors are made of nickel or an iron alloy.

254. (original) A thermal fuse having a function of a current fuse according to claim 110, wherein said flat lead conductors are made of nickel or an iron alloy.

255. (original) A thermal fuse having a function of a current fuse according to claim 111, wherein said flat lead conductors are made of nickel or an iron alloy.

256. (original) A thermal fuse having a function of a current fuse according to claim 112, wherein said flat lead conductors are made of nickel or an iron alloy.

257. (original) A thermal fuse having a function of a current fuse according to claim 113, wherein said flat lead conductors are made of nickel or an iron alloy.

258. (original) A thermal fuse having a function of a current fuse according to claim 114, wherein said flat lead conductors are made of nickel or an iron alloy.

259. (original) A thermal fuse having a function of a current fuse according to claim 115, wherein said flat lead conductors are made of nickel or an iron alloy.

260. (original) A thermal fuse having a function of a current fuse according to claim 116, wherein said flat lead conductors are made of nickel or an iron alloy.

261. (original) A thermal fuse having a function of a current fuse according to claim 117, wherein said flat lead conductors are made of nickel or an iron alloy.

262. (original) A thermal fuse having a function of a current fuse according to claim 118, wherein said flat lead conductors are made of nickel or an iron alloy.

263. (original) A thermal fuse having a function of a current fuse according to claim 119, wherein said flat lead conductors are made of nickel or an iron alloy.

264. (original) A thermal fuse having a function of a current fuse according to claim 120, wherein said flat lead conductors are made of nickel or an iron alloy.

265. (original) A thermal fuse having a function of a current fuse according to claim 121, wherein said flat lead conductors are made of nickel or an iron alloy.

266. (original) A thermal fuse having a function of a current fuse according to claim 122, wherein said flat lead conductors are made of nickel or an iron alloy.

267. (original) A thermal fuse having a function of a current fuse according to claim 123, wherein said flat lead conductors are made of nickel or an iron alloy.

268. (original) A thermal fuse having a function of a current fuse according to claim 124, wherein said flat lead conductors are made of nickel or an iron alloy.

269. (original) A thermal fuse having a function of a current fuse according to claim 125, wherein said flat lead conductors are made of nickel or an iron alloy.

270. (original) A thermal fuse having a function of a current fuse according to claim 126, wherein said flat lead conductors are made of nickel or an iron alloy.

271. (original) A thermal fuse having a function of a current fuse according to claim 127, wherein said flat lead conductors are made of nickel or an iron alloy.

272. (original) A thermal fuse having a function of a current fuse according to claim 128, wherein said flat lead conductors are made of nickel or an iron alloy.

273. (original) A thermal fuse having a function of a current fuse according to claim 129, wherein said flat lead conductors are made of nickel or an iron alloy.

274. (original) A thermal fuse having a function of a current fuse according to claim 130, wherein said flat lead conductors are made of nickel or an iron alloy.

275. (original) A thermal fuse having a function of a current fuse according to claim 131, wherein said flat lead conductors are made of nickel or an iron alloy.

276. (original) A thermal fuse having a function of a current fuse according to claim 132, wherein said flat lead conductors are made of nickel or an iron alloy.

277. (original) A thermal fuse having a function of a current fuse according to claim 133, wherein said flat lead conductors are made of nickel or an iron alloy.

278. (original) A thermal fuse having a function of a current fuse according to claim 134, wherein said flat lead conductors are made of nickel or an iron alloy.

279. (original) A thermal fuse having a function of a current fuse according to claim 135, wherein said flat lead conductors are made of nickel or an iron alloy.

280. (original) A thermal fuse having a function of a current fuse according to claim 136, wherein said flat lead conductors are made of nickel or an iron alloy.

281. (original) A thermal fuse having a function of a current fuse according to claim 137, wherein said flat lead conductors are made of nickel or an iron alloy.

282. (original) A thermal fuse having a function of a current fuse according to claim 138, wherein said flat lead conductors are made of nickel or an iron alloy.

283. (original) A thermal fuse having a function of a current fuse according to claim 139, wherein said flat lead conductors are made of nickel or an iron alloy.

284. (original) A thermal fuse having a function of a current fuse according to claim 140, wherein said flat lead conductors are made of nickel or an iron alloy.

285. (original) A thermal fuse having a function of a current fuse according to claim 141, wherein said flat lead conductors are made of nickel or an iron alloy.

286. (original) A thermal fuse having a function of a current fuse according to claim 142, wherein said flat lead conductors are made of nickel or an iron alloy.

287. (original) A thermal fuse having a function of a current fuse according to claim 143, wherein said flat lead conductors are made of nickel or an iron alloy.

288. (original) A thermal fuse having a function of a current fuse according to claim 144, wherein said flat lead conductors are made of nickel or an iron alloy.

Amendments to the Drawings:

The attached sheet of drawings includes changes to Figs. 4 and 5. This sheet, which includes Figs. 4 and 5, replaces the original sheet containing these Figs. In both Figs. 4 and 5, the legend "Prior Art" has been added.

Attachment: Replacement Sheet

REMARKS

Claims 1-288 are presently pending in the application.

In the present Office Action, the Examiner has objected to the specification because of a typographical error in paragraph [0023] (page 13, line 9). As suggested by the Examiner, the phrase "50 to 100 A" has been corrected to "2 to 10 A" (as in paragraph [0014] of the specification, for example), and withdrawal of the objection is respectfully requested.

Additionally, Figs. 4 and 5 have been amended to add the legend "Prior Art," as requested by the Examiner. Accordingly, acceptance of the replacement sheet of drawings is respectfully requested.

Claim 1 has been amend to clarify the rush current resistance performance and to recite that the low-melting fusible alloy piece has an operating current at 5 ms of larger than 100 A. Support for this amendment may be found in the specification at least in paragraph [0046]. Further, claims 37-72 have been amended to recite that the ratio d/t is 2 to 4, rather than 2 to 5, which is supported in the specification at least in paragraph [0038]. No new matter has been added by these amendments, and entry is respectfully requested.

The Examiner has rejected claims 1, 5, 7, 11, 13 and 17 under 35 U.S.C. § 102(b) as being anticipated by JP 2002-150906 ("JP '906") and claims 2, 6, 8, 12, 14 and 18 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '906. Additionally, claims 3, 4, 9, 10, 15, and 16 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '906 in view of U.S. Patent No. 6,040,754 of Kawanishi ("Kawanishi"). Finally, claims 19-36 and 37-288 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '906 in view of Kawanishi and U.S. Patent Application Publication No. 2002/0113685 of Izaki et al. ("Izaki"). Applicants respectfully traverse these rejections and the arguments in support thereof as follows, and respectfully request reconsideration and withdrawal of the rejections.

Rejection Under § 102(b) Based on JP '906

Regarding claim 1, the Examiner argues that JP '906 teaches a thermal fuse having a function of a current fuse in which a low-melting fusible alloy piece having an alloy composition containing 40 to 70% Bi is connected between a pair of flat lead conductors, a flux is applied to

the alloy piece, and the alloy piece is sandwiched between a resin base film and a resin cover film to provide insulation, wherein a resistance of the low-melting fusible alloy piece is set so as to enable the piece to be fused off also by Joule heat due to an allowable maximum current of a secondary battery. JP '906 allegedly also teaches the elements of the rejected dependent claims 5, 7, 11, 13 and 17. Accordingly, the Examiner concludes that JP '906 anticipates these claims. Applicants respectfully traverse this rejection as follows.

JP '906 teaches an alloy type thermal fuse in which the alloy used as a fuse element contains 45-55% Bi and remainder In. JP '906 also teaches that the fuse can be operated with superior precision at an operating temperature of 85-95°C. However, JP '906 does not teach or suggest that an operating current of a low-melting fusible alloy piece at 5 ms is 100 A as claimed. Therefore, JP '906 does not teach or suggest all of the claimed elements and does not anticipate the claims. Accordingly, reconsideration and withdrawal of the § 102(b) rejection are respectfully requested.

Rejection Under § 103(a) Based on JP '906

Regarding claim 2, the Examiner argues that JP '906 teaches that a melting point of the low-melting fusible alloy piece is 85 to 95°C. The Examiner acknowledges that JP '906 does not teach the allowable current, but argues that it would have been obvious to one skilled in the art at the time of the invention that the cross section of the fusible alloy and lead conductors can be selected to allow any maximum current, including the allowable maximum current of 2 to 10 A for a period of 1,000 seconds, before heating above the melting point of the fusible alloy. The Examiner also argues that JP '906 teaches the elements of the rejected dependent claims 6, 8, 12, 14 and 18, and thus concludes that these claims are unpatentable over JP '906. Applicants respectfully traverse this rejection as follows.

As previously explained, JP '906 does not teach or suggest the claimed operating current at 5 ms of larger than 100 A, or any operating current at all. Therefore, there would have been no motivation based on JP '906 to produce a fusible alloy piece having the claimed operating current. Applicants have specifically designed the presently claimed thermal fuses to function as current fuses by setting a resistance of the fuse element so that the fuse will operate at the

claimed allowable maximum current and not at a rush current of 50-100A and 5 ms (see paragraph [0030] of the specification). There would have been no motivation based on JP '906 to provide such properties to a thermal fuse, nor any expectation that such a current would lead to the results exhibited by the presently claimed invention. Accordingly, none of the claims would have been obvious over JP '906, and reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

Rejection Under § 103(a) Based on JP '906 in view of Kawanishi

Regarding claims 3 and 4, the Examiner argues that JP '906 teaches all of the claimed structural elements. However, the Examiner also states that JP '906 does not teach front ends of the flat lead conductors, a rear surface, or a surface of the resin base film. These statements appear to be contradictory and are thus confusing. The Examiner further argues that Kawanishi teaches that front end portions of the pair of flat lead conductors are secured to a rear face of the resin base film, and that a part of each of the front end portions is exposed from a surface of the base film. JP '906 allegedly also teaches the elements of claims 9, 10, 15, and 16. Accordingly, the Examiner concludes that it would have been obvious to one skilled in the art at the time of the invention to modify the fuse of JP '906 with that of Kawanishi to use a low-melting fusible alloy piece manufactured from a non-hazardous alloy with the desired mechanical properties. However, since Kawanishi is cited for its alleged teaching of structural elements, and not a non-hazardous alloy or specific mechanical properties, Applicants do not understand the Examiner's conclusion or the Examiner's motivation for combining JP '906 with Kawanishi. However, Applicants still respectfully traverse this rejection as follows.

As previously explained, JP '906 does nor teach or suggest all of the elements of independent claim 1, such as the claimed operating current at 5 ms of larger than 100 A. Kawanishi is directed to a thin type thermal fuse having specific structural relationships but does not teach or suggest the claimed operating current. Therefore, Kawanishi does not cure the deficiency with JP '906. Further, since Kawanishi does not teach any operating current, there would have been no motivation to alter the current taught by Kawanishi to fall within the claimed range. Accordingly, even the proposed combination of JP '906 with Kawanishi would

not render obvious the presently claimed invention, and reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

Rejection Under § 103(a) Based on JP '906 in view of Kawanishi and Izaki

Regarding claims 19-36, the Examiner acknowledges that Applicants' prior art and JP '906 do not teach the claimed fuse resistance of 4.5 to 50 mΩ. However, Izaki allegedly teaches a resistance of a low-melting fusible alloy piece of 4.5 to 50 mΩ in paragraph [0188]. Therefore, the Examiner concludes that it would have been obvious to one skilled in the art to modify the fuse of Applicants' prior art with that of Izaki to select a resistance of the low-melting fusible alloy based upon the desired operating conditions and select an alloy, cross section and length piece to be 4.5 to 50 mΩ or any other value to provide for the desired heat dissipation before the low-melting fusible alloy melts. Applicants respectfully traverse this rejection as follows.

As previously explained, even the proposed combination of JP '906 and Kawanishi does not teach or suggest the claimed operating current of larger than 100A at 5 ms. Izaki teaches a thermal fuse having particular structural elements and relationships. In one embodiment. Izaki teaches a resistance of 13±1mΩ as being "non-defective." However, Izaki does not teach or suggest the claimed operating current, or any operating current, and thus does not cure the deficiency with the Kawanishi/JP '906 combination. Accordingly, even the proposed combination of Izaki with JP '906 and Kawanishi would not teach or suggest all of the claimed elements, and reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

Rejection Under § 103(a) Based on JP '906 in view of Kawanishi, and Izaki

Regarding claims 37-72, the Examiner acknowledges that the prior art, JP '906 and Izaki do not teach the claimed diameter to thickness (d/t) ratio of the fuse. However, Kawanishi allegedly teaches a ratio d/t of an outer diameter d (col. 3, line 45 100-500 microns) of the low-melting fusible alloy piece to a thickness t (col. 3, lines 51-52, 500-200 microns) of each of the flat lead conductors of 2 to 5 (ratio of 2 at minimum, 2.5 at maximum). Therefore, the Examiner concludes that it would have been obvious to modify the fuse of Applicants' prior art with that of

JP '906 in view of Izaki with that of Kawanishi for the purpose of selecting a d/t ratio of 2 to 5, or any other value, to allow the lead conductors to absorb the initial surge current prior to the fuse temperature obtaining the melting point of the fusible alloy piece. Applicants respectfully traverse this rejection as follows.

According to the presently claimed invention, the ratio d/t is 2 to 4. The Examiner argues that in col. 3, line 45, Kawanashi teaches a diameter d of 100 to 500 microns. However, in this line, Kawanishi actually teaches that the diameter is "set in a range of 500 microns to 100 microns." Since it is common practice to specify a range with the upper limit following the lower limit, Applicants submit that "100 microns" is a typographical error, and should correctly read "1000 microns." The Examiner's attention is drawn to the fact that one of the Applicants of the present invention is the inventor of Kawanishi and thus knows all of the details of the invention of Kawanishi.

Further, the European counterpart to Kawanishi, EP 0 964 419 B1, teaches "1000 microns," and the priority document to Kawanishi, Japanese Patent Application No. JP 10-179675 (JP 11-353996A), also teaches "1000 microns." Kawanishi also teaches in col. 3, lines 47-48 that the cross area of the wire is 0.78 to 3.2 mm^2. The cross-sectional area A of a circular wire is equal to πr^2, in which r is the radius of the wire, and the diameter d of the wire is equal to 2r. Accordingly, when the area A = 0.78 mm^2, r = 0.50 mm and d = 1.00 mm (1000 microns). Finally, Kawanishi teaches in col. 4, line 36 that one sample had a diameter of 550 microns, which is in the range of *500 to 1000* microns but not in the range of 100 to 500 microns. Accordingly, it is quite clear the Kawanishi intended to teach d values in the range of 500 to 1000 microns.

The Examiner further argues that Kawanishi teaches "t" values of 50- 200 microns. The Examiner then determines the range of d/t ratios by calculating the minimum and maximum ratios. Specifically, the Examiner calculates:

$$\frac{\text{100 microns (minimum d)}}{\text{50 microns (minimum t)}} = 2 \qquad \frac{\text{500 microns (maximum d)}}{\text{200 microns (maximum t)}} = 2.5$$

and thus arrives at a range of 2-2.5 for the d/t ratios taught by Kawanishi.

Using the same method with the corrected d values taught by Kawanishi:

$$\frac{\text{500 microns (minimum d)}}{\text{50 microns (minimum t)}} = 10 \qquad \frac{\text{1000 microns (maximum d)}}{\text{200 microns (maximum t)}} = 5$$

Thus, using the method of the Examiner to calculate the d/t ratio based on the values of Kawanishi results in a d/t range of 5 to 10. This range does not fall within Applicants' claimed range of 2 to 4. Further, it is important to the presently claimed invention that the ratio be 2 to 4 since this ratio surely shows the rush current resistance effect and surely enables the low-melting fusible alloy piece to be fused off by Joule heat due to an allowable maximum current of a secondary battery (that is, 2 to 10 A and 1000 s). Not only does Kawanishi not teach or suggest the claimed d/t ratio of 2 to 4, but Kawanishi also does not suggest varying the ratio to arrive at Applicants' ratio. Finally, the results of the present invention would not have been expected based on Kawanishi.

Regarding claims 73-144, the Examiner acknowledges that the prior art does not teach the overall thickness of the fuse. However, Kawanishi allegedly teaches a thickness from a lower face of the resin base film to an upper face of the resin cover film of 2.0 mm or smaller (namely, the sum of 50-500 microns for **11**, 50-200 microns for **2**, 100-500 microns for **3**, and 50-500 microns for **12**, for a maximum total of 1700 microns (1.7 mm)). Therefore, the Examiner concludes that it would have been obvious to modify the fuse of applicants' prior art with that of JP '906 in view of Izaki and further in view of Kawanishi for the purpose of having an overall thickness to fit within the battery pack housing. Applicants respectfully traverse the Examiner's conclusion.

As noted above, the diameter of element **3** (fusible alloy piece) is actually 500 to 1000 microns, making the maximum thickness of Kawanishi the sum of 500 microns + 200 microns + 1000 microns + 500 microns = 2200 microns or 2.2 mm. This maximum thickness does not fall within Applicants' claimed range.

Finally, regarding claims 145-288, the Examiner acknowledges that the cited prior art does not teach that the lead conductors are nickel or an iron alloy. However, Kawanishi

allegedly teaches that the flat lead conductors are made of nickel or an iron alloy. Therefore, the Examiner concludes that it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the fuse of the prior art with that of JP '906 in view of Izaki and Kawanishi for maximizing the current to the fuse element and minimizing the thermal resistance of the balance of the fuse including the lead conductors. Applicants respectfully traverse this rejection as follows.

Even if, *arguendo*, Kawanishi were to teach the d/t ratio recited in claims 37-72, the overall thickness of the fuse recited in claims 73-144, or the materials of the lead conductors recited in claims 145-288, Kawanishi would still not teach or suggest the claimed operating current. Accordingly, even the proposed combination of references would not teach or suggest all of the claimed elements, and reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

Based on the preceding Amendments and Remarks, Applicants respectfully submit that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

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June 1, 2006
(Date)

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Attachment: Replacement Sheet with Figs. 4 and 5